

CAPITAL IMPROVEMENT PLAN

FISCAL YEARS
2017 – 2021

ADOPTED
MARCH 2017



OBSERVATORY WATER
TREATMENT PLANT



NEW RIVANNA PUMP
STATION



NEW RIVANNA PUMP
STATION



NEW RIVANNA PUMP
STATION



SOUTH RIVANNA WATER
TREATMENT PLANT



RIVANNA WATER & SEWER AUTHORITY

695 MOORES CREEK LANE, CHARLOTTESVILLE, VIRGINIA 22902

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Introduction

The Capital Improvement Plan (CIP) for Fiscal Years 2017-2021 has been prepared as a guidance document outlining future infrastructure projects needed to meet the Rivanna Water and Sewer Authority's core mission of providing safe, high-quality, cost-effective wholesale water and wastewater services to the Charlottesville and Albemarle community. The CIP is a 5-year planning document, which is updated annually to reflect the needs of the community and progress on adopted projects as they move toward final design and construction. This document provides estimates of project costs and schedules that will help the Board of Directors and staff to understand the financial implications of the program.

The development of the Capital Improvement Plan is a process of requests from the Board and community, regulatory mandates, safety concerns, renewal and rehabilitation needs, and bringing together master plans. Each year these identified projects are reviewed and prioritized by the Authority management team and brought forth for review by the Board of Directors.

During the past year several capital projects were completed or are very near completion, and as such are being removed from the 2017-2021 CIP. These projects account for approximately \$14.2 million or 10.6% of FY 15-19 CIP and were under budget by a combined \$0.45 million. These projects include:

- Meadowcreek Interceptor Closeout
- Lower Schenks Branch Interceptor
- Albemarle-Berkley Interceptor
- Comprehensive Sanitary Sewer Model and Study Update
- MCAWRRF Administration Building Repairs

The total 5-year 2017-2021 CIP is approximately \$135.9 million, with the previous expenditures on active projects totaling approximately \$37.8 million, leaving a net proposed 5-year projected expenditure of \$98.1 million.

There are several new projects added to the CIP this year, with a total estimated cost of \$7,106,442, including:

- Interconnect Lower Sugar Hollow and Ragged Mountain Raw Water Mains (\$225,000)
- Flow Meter and Automatic Valve on the Sugar Hollow to Ragged Mountain Transfer (\$150,000)
- Sugar Hollow Dam Rubber Crest Gate Replacement and Intake Tower Repairs (\$940,000)
- South Fork Water Treatment Plant Improvements (\$5,430,442)
- Crozet Water System Master Plan (\$300,000)
- Glenmore WWRF Influent Pump and VFD Addition (\$61,000)

There are a few projects where the proposed budgets have been modified based on the anticipated project requirements and necessitate funding adjustments. The projects with changes include:

- Observatory Water Treatment Plant Improvements (\$9.50 million existing / \$10 million proposed)
- Route 29 Pump Station Site Acquisition (\$1.9 million existing / \$1.22 million proposed)
- Route 29 Pipeline VDOT Betterment (\$3.075 million existing / \$2.9 million proposed)
- Avon to Pantops Water Main (\$0.25 million existing / \$5.5 million proposed)
- South Fork Hydropower Plant Decommissioning (\$2 million existing / \$1 million proposed)
- Buck's Elbow Tank – Interior Coating and Mixing (\$1.055 million existing / \$1.2 million proposed)
- Upper Schenks Branch Interceptor (\$6.67 million existing / \$9.01 million proposed)
- Rivanna Pump Station and Tunnel (\$33.3million existing / \$32.2 million proposed)
- Crozet Flow Equalization Tank (\$2.33 million existing / \$3.75 million proposed)
- Crozet Pump Stations Bypass Fittings and Isolation Valves (\$0.22 million existing / \$0.72 million proposed)
- MCAWRRF Odor Control - Phase 2 (\$9.8 million existing / \$10.1 million proposed)
- MCAWRRF Roof Replacements (\$0.9 million existing / \$1.3 million proposed)
- MCAWRRF Second Centrifuge (\$1.025 million existing / \$1.29 million proposed)
- Radio Upgrades (\$0.5 million existing / \$0.52 million proposed)

FINANCIAL SUMMARY
MAJOR SYSTEM CATEGORIES

FINANCIAL SUMMARY Major System Categories

System Description	Five-Year Capital Program			Previous Expenditures	Projected Future Expenses by Year				
	As Adopted (2/23/16)	Proposed Changes	Recommended		FY17	FY18	FY19	FY20	FY21
URBAN WATER (UW)									
Community Water Supply Plan	\$5,795,000	(\$3,362,442)	\$2,432,558	\$152,807	\$0	\$1,000,000	\$669,193	\$600,558	\$10,000
Observatory WTP & Ragged Mountain/Sugar Hollow Reservoir System	\$9,785,000	\$1,815,000	\$11,600,000	\$422,979	\$918,021	\$354,000	\$2,036,000	\$6,142,000	\$1,727,000
Finished Water Storage/Distribution - Urban System	\$35,350,494	\$4,410,242	\$39,760,736	\$11,373,300	\$18,946,524	\$4,380,366	\$1,060,000	\$1,500,000	\$2,500,000
South & North Fork Rivanna Water System	\$2,621,000	\$445,684	\$7,066,684	\$58,552	\$886,242	\$1,191,448	\$500,000	\$1,321,442	\$3,109,000
Subtotal (UW)	\$53,551,494	\$7,293,242	\$60,844,736	\$12,007,638	\$20,736,091	\$6,925,814	\$4,265,193	\$9,564,000	\$7,346,000
RURAL WATER (RW)									
Crozet Water System	\$13,851,890	\$445,000	\$14,296,890	\$1,099,852	\$3,305,578	\$2,840,346	\$295,000	\$1,915,000	\$4,841,114
Scottsville Water System	\$1,715,000	\$0	\$1,715,000	\$330,665	\$910,000	\$374,334	\$100,000	\$0	\$0
Subtotal (RW)	\$15,566,890	\$445,000	\$16,011,890	\$1,430,517	\$4,215,578	\$3,214,680	\$395,000	\$1,915,000	\$4,841,114
WATER TOTAL	\$69,118,384	\$7,738,242	\$76,856,626	\$13,438,155	\$24,951,669	\$10,140,494	\$4,660,193	\$11,479,000	\$12,187,114

System Description	Five-Year Capital Program			Previous Expenditures	Projected Future Expenses by Year				
	As Adopted (2/23/16)	Proposed Changes	Recommended		FY17	FY18	FY19	FY20	FY21
URBAN WASTEWATER (UWW)									
Wastewater Interceptors/ Pumping Stations	\$46,897,149	(\$1,526,825)	\$45,370,324	\$23,433,038	\$10,107,442	\$4,273,000	\$6,737,500	\$520,285	\$299,059
Moore's Creek AWWRF	\$12,555,000	\$521,746	\$13,076,746	\$970,520	\$6,528,854	\$5,181,372	\$396,000	\$0	\$0
Radio Upgrades	\$500,000	\$21,000	\$521,000	\$0	\$521,000	\$0	\$0	\$0	\$0
Subtotal (UWW)	\$59,952,149	(\$984,079)	\$58,968,070	\$24,403,558	\$17,157,296	\$9,454,372	\$7,133,500	\$520,285	\$299,059
RURAL WASTEWATER (RWW)									
Scottsville WRRF	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Glenmore WRRF	\$0	\$61,000	\$61,000	\$0	\$0	\$0	\$0	\$0	\$61,000
Subtotal (RWW)	\$0	\$61,000	\$61,000	\$0	\$0	\$0	\$0	\$0	\$61,000
WASTEWATER TOTAL	\$59,952,149	(\$923,079)	\$59,029,070	\$24,403,558	\$17,157,296	\$9,454,372	\$7,133,500	\$520,285	\$360,059
TOTAL	\$129,070,533	\$6,815,163	\$135,885,696	\$37,841,713	\$42,108,965	\$19,594,866	\$11,793,693	\$11,999,285	\$12,547,173

PROJECT DETAILS

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Completed Projects

During fiscal year 2016 several capital improvement projects were completed or are in the final phases of close-out, and as such will be removed from consideration in future planning documents. Presented in the table below are the five (5) completed projects, pertinent information on the adopted budgets, as well as the projected final costs and any anticipated savings. There was a total completed projects cost savings of \$450,659.

No.	Project Description	Five-Year Capital Program				Budget Reallocation
		Adopted Budget (2/23/2016)	Previous Expenditures (7/1/16)	Final Projected Costs	Savings	
25	Meadowcreek Interceptor Closeout	\$4,200,000	\$3,790,178	\$3,943,171	\$256,829	
26	Lower Schenks Branch Interceptor	\$9,014,760	\$4,064,748	\$4,064,748		
27	Albermarle-Berkley Interceptor	\$181,606	\$24,706	\$24,706	\$161,900	
31	Comprehensive Sanitary Sewer Model & Study Update	\$390,000	\$348,127	\$358,070	\$31,930	
36	MCAWRRF Administration Building Repairs	\$450,000	\$365,254	\$365,254		
	TOTAL	\$14,236,366	\$8,593,013	\$8,755,949	\$450,659	\$0

25. Meadowcreek Interceptor Closeout: The Meadowcreek Interceptor project included the replacement of approximately 22,000 linear feet of interceptor with larger diameter pipe to provide capacity for wet weather flow. The new pipeline is operational and providing improved service to both the City of Charlottesville and Albemarle County Service Authority. The construction activities at the end of the project were contentious and resulted in litigation with the Contractor. The lawsuit has since been settled, and the budget for this project included the settlement payments as well as liquidated damages owed to the Meadowcreek Golf Course; both of which have been taken care of and accounted for. The remaining funds in this project were used to resolve numerous punch list items and correct defective work. Repairs associated with the defective work were separated into three distinct phases. The first two phases of the work were focused on defects associated with piping connections from the new interceptor to the City of Charlottesville's existing collection system. The second phase of the work addressed poor flow characteristics within a junction manhole where a City of Charlottesville basin discharges. The sewer alignment in this area was adjusted and manholes added to alleviate this condition. All repairs have been completed.

26. Lower Schenks Branch Interceptor: The Schenks Branch Interceptor is located in the eastern part of the City of Charlottesville and ties into the Meadowcreek Interceptor. The interceptor was constructed in the mid-1950s of 21-inch clay and concrete pipe. The

existing interceptor is undersized to serve present and future wet weather flows as determined by the City, and is to be upgraded to 30-inch pipe. The Lower Schenks Branch includes three sections. The first portion of this sewer was constructed as part of the Meadowcreek Interceptor project. The second portion was constructed as part of the VDOT McIntire Road Extended project in 2012. The third portion was constructed as part of the McIntire/250 Interchange project and the Certificate to Operate was issued by DEQ in 2014. All work associated with the upgrade of this portion of the Schenks Branch Interceptor is complete.

27. Albemarle-Berkley Interceptor: The Albemarle-Berkley Interceptor is located in Albemarle County and ties into the Meadowcreek Interceptor. The existing interceptor was built in the mid-1970s mostly of clay pipe, and has the capacity to handle the existing and future dry weather flows through build-out. However, based on flow metering and manhole inspections, the interceptor has experienced substantial inflow and infiltration and the interceptor required rehabilitation. A condition assessment was performed on the interceptor, which resulted in the installation of a cured-in-place liner through the entire length of the pipeline (9,532 linear feet). As a result of the condition assessment, defects were also identified in 44 manholes. All rehabilitation work was completed in December 2015.

31. Comprehensive Sanitary Sewer Model and Study Update: Due to wet weather inflow and infiltration (I/I); projected growth, and infill, the RWSA interceptor system required evaluation of current and future flows. A consultant conducted flow metering and developed a system-wide computer modeling evaluation in 2006 which allowed RWSA, the City and ACSA to collectively identify system deficiencies, develop inflow and infiltration reduction goals, and project and prioritize future capital needs. The study was finalized in 2010. Subsequently, RWSA installed 12 permanent sanitary sewer flow meters to better understand the system operations.

In April 2014 the City, ACSA, and RWSA entered into a Wastewater Projects Cost Allocation Agreement (Agreement) with the purpose of allocating costs for capacity-related projects. As part of that agreement, RWSA must routinely update future flow projections, and measured dry and wet weather flows, for each the City and ACSA. These projections are made through a calibrated wastewater model from flows measured in sewer pipes. Additional temporary flow meters were installed from November 2014 until May 2015 to collect discrete flow data from the City and ACSA entering the RWSA system in order to update the model and evaluate I/I reduction goals and future capital project needs in accordance with the requirements of the Agreement. Data from both the temporary flow meters and the permanent flow meters were used to determine the impacts of wet weather on the collection system as necessary for modeling and flow projection analyses. The project also included updated population projections for the region, capacity evaluations, and the completion of flow tables for the Wastewater Projects Cost Allocation Agreement. This project was completed and a final report was provided in July 2016.

36. Moore's Creek AWWRF Administration Building Repairs: The RWSA Administration Building was constructed in 1978 as part of the Moore's Creek wastewater treatment

facility, with the addition of an elevator and office space in 1995. Over the past several years there have been several significant building maintenance issues. As a result, in October 2012, staff commissioned an architectural, mechanical, electrical, and plumbing evaluation of the building, which identified several near, mid, and long-term repair needs. The first round of improvements in this project included the replacement of the entire roof with a standing seam aluminum material, gutter and downspout replacement, and electrical circuit mapping and rewiring, window replacement, and building repainting. The roof replacement was completed in late 2014.

URBAN WATER

Major System: Community Water Supply Plan

The Community Water Supply Plan represents the program developed with substantial community input to fulfill RWSA's contractual obligation to the City of Charlottesville (City) and the Albemarle County Service Authority (ACSA) to provide adequate drinking water for their future needs. An initiative started in 2003 to find a long-term solution that could achieve both local support and meet federal and state requirements. After multiple community meetings, updates with local officials, and frequent consultations with federal and state agencies, local support was obtained to apply for federal and state permits to expand the Ragged Mountain Reservoir and build a future pipeline between the South Rivanna and Ragged Mountain Reservoirs, with stream and wetlands mitigation to be provided through property in the Buck Mountain Creek area and property adjacent to a lower reach of Moores Creek near its confluence with the Rivanna River. Federal and state permits were granted in 2008, and amended in 2011.

The first phase of this long-term program centered around the expansion of the Ragged Mountain Reservoir, a project that would simultaneously address a legal obligation to correct safety deficiencies on the existing site. Through a combination of technical investigations, engineering evaluations, and continued public discussion, a decision was reached in February 2011 through the City Council and Board of Supervisors to build the new dam as an earthen dam, with the initial phase raising the reservoir pool height by 30 feet. The decision also outlined an objective of the further pursuit of water conservation through the City and ACSA, and the pursuit of opportunities for dredging of the South Rivanna Reservoir, with the second phase of reservoir expansion in the future as necessary.

Projects below represent the proposed focus of this program for the next five years.

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/16)	Projected Future Expenses by Year				
		As Adopted (2/23/16)	Proposed Changes	Recommended		FY17	FY18	FY19	FY20	FY21
1	South Fork Rivanna Reservoir to Ragged Mountain Reservoir Pipeline Right-of-Way	\$2,295,000		\$2,295,000	\$25,249		\$1,000,000	\$669,193	\$600,558	
2	South Fork Rivanna Reservoir Dredging	\$3,500,000	\$3,362,442	\$137,558	\$127,558					\$10,000
	TOTAL	\$5,795,000	\$3,362,442	\$2,432,558	\$152,807	\$0	\$1,000,000	\$669,193	\$600,558	\$10,000

Project Descriptions:

1. South Fork Rivanna Reservoir to Ragged Mountain Reservoir Pipeline Right-of-Way: The future construction of a new pipeline from the South Rivanna River to the Ragged Mountain Reservoir is a part of the approved 50-year Community Water Supply Plan to increase future transfer capacity through replacement of the Upper Sugar Hollow Pipeline

along an alternative alignment. Prior expenditures covered a review of the 2009 conceptual design that was requested by the Board through the “four boards”¹. The previous anticipated preliminary route for this project was along the proposed Western Bypass. Since the Bypass has been eliminated from consideration, the pipeline project will involve a more detailed routing study, and acquisition of real estate rights along the approved route.

2. South Rivanna Reservoir Dredging: The South Rivanna Reservoir stores raw water for treatment at the South Rivanna Water Treatment Plant and in the future is proposed to provide water for transfer to the enlarged Ragged Mountain Reservoir. River flow into the reservoir is from a drainage area, almost entirely within Albemarle County, of approximately 259 square miles. Soil erosion from natural events, from land use in the agricultural area, from land disturbances in the developed areas, and from re-suspension of flood plain deposits created during the 19th century (stream bank erosion), are likely the causes of sediment becoming trapped within the reservoir. The initial design of the reservoir anticipated the accumulation of these sediments, and a significant portion of the total storage volume was designated for this purpose. Currently the sediment stored does not exceed the available capacity.

The January 2012 Ragged Mountain Project Agreement outlines that “the City and ACSA agree to direct, and RWSA agrees, to perform such dredging projects at the South Fork Rivanna Reservoir as may be specified jointly by the City and ACSA pursuant to the Water Cost Allocation Agreement.” The Cost Allocation Agreement stipulates that target maintenance dredging shall be performed, and that the dredging be market driven, cost effective, and opportunistic and shall not exceed \$3.5M. In 2012 and 2013, RWSA, via the Public-Private Education Facilities and Infrastructure Act (PPEA) process, solicited proposals to provide maintenance dredging. In July 2013, the one qualified PPEA proposer, withdrew its proposal, citing difficulties in obtaining necessary land agreements.

Future Board decisions on the project contracting approach will dictate the next steps. This project remains in the CIP as the fulfillment of a contractual obligation from the January 2012 Ragged Mountain Dam Cost Allocation Agreement, and RWSA counsel has offered an opinion that consent to amend the Agreement from the City and ACSA is required before the RWSA Board amend or cancel the project.

¹ The “four boards” include the Albemarle County Board of Supervisors, the Albemarle County Service Authority Board of Directors, the Charlottesville City Council, and the Rivanna Water & Sewer Authority (RWSA) Board of Directors. Although the RWSA Board of Directors is fully empowered to make decisions regarding water supply, it has met jointly with the other three boards to seek advice on major decisions.

Major System: Observatory WTP and Ragged Mountain/Sugar Hollow Reservoir System

The Observatory Water Treatment Plant (WTP) and Ragged Mountain/Sugar Hollow Reservoir System is comprised of the water treatment facility on Observatory Mountain and the associated raw water infrastructure that stores and conveys source water to the plant. The raw water storage system includes the new Ragged Mountain Dam (constructed in 2014, with a useable raw water storage capacity of 1.5 billion gallons) and the Sugar Hollow Dam (originally constructed in 1947, upgraded in 1999 and downstream discharge improvements completed in September 2014, with a useable raw water storage capacity of 339 million gallons as updated by a 2015 bathymetric survey). The system also includes 17.6 miles of 18-inch raw water cast-iron mains, originally installed in 1908, 1922, and 1946. The Sugar Hollow Raw Water Main historically conveyed water from the Sugar Hollow Dam to the Observatory Water Treatment Plant, however, as a result of the New Ragged Mountain Dam project, the main now discharges directly into Ragged Mountain Reservoir. The remaining downstream section of the Sugar Hollow main now conveys raw water from the Ragged Mountain Reservoir to the treatment plant. The line crosses the Mechums River (where an abandoned pumping station is sited) on its way to Ragged Mountain Reservoir, and eventually passes through the Royal Pumping Station and terminates at the Observatory WTP. The Ragged Mountain Raw Water Main conveys water from the Ragged Mountain Reservoir through the Stadium Road Pumping Station and terminates at the Observatory Water Treatment Plant.

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/16)	Projected Future Expenses by Year				
		As Adopted (2/23/16)	Proposed Changes	Recommended		FY17	FY18	FY19	FY20	FY21
3	Observatory Water Treatment Plant Improvements	\$9,500,000	\$500,000	\$10,000,000	\$422,979	\$768,021	\$315,000	\$1,795,000	\$5,384,000	\$1,315,000
4	Ragged Mountain Reservoir to Observatory Water Treatment Plant Pipeline Condition Assessment	\$285,000		\$285,000					\$285,000	
5	Interconnect Lower Sugar Hollow and Ragged Mountain Raw Water Mains	\$0	\$225,000	\$225,000			\$39,000	\$186,000		
6	Sugar Hollow to Ragged Mountain Reservoir Transfer Flow Meter	\$0	\$150,000	\$150,000		\$150,000				
7	Sugar Hollow Dam - Rubber Crest Gate Replacement & Intake Tower Repairs	\$0	\$940,000	\$940,000				\$55,000	\$473,000	\$412,000
	TOTAL	\$9,785,000	\$1,815,000	\$11,600,000	\$422,979	\$918,021	\$354,000	\$2,036,000	\$6,142,000	\$1,727,000

Project Descriptions:

3. Observatory Water Treatment Plant Improvements: The Observatory Water Treatment Plant is the oldest of the three urban plants. Early planning for the Community Water Supply envisioned that the plant would undergo a wholesale upgrade. This upgrade will concentrate on specific improvements to critical elements, identified by a Needs Assessment Study as improvements to the flocculators, filters, sedimentation basins, and chemical feed facilities to enhance future reliability. In addition, the existing reinforced concrete flume, which conveys treated water from the sedimentation basins to the filters, is in need of repair or possible replacement.

The Observatory Water Treatment Plant was originally constructed in the mid-1950s. Since that time very little has been replaced or upgraded at the facility. The sixty year old facility has much of the original equipment that is inefficient, prone to unexpected failure, and does not have readily accessible replacement parts. A project is currently under construction as part of the Observatory Water Treatment Plant GAC construction contract to replace the existing flocculator systems. One basin is scheduled to be in service by the end of 2016, while the second basin will be in service by late 2017.

The remaining proposed treatment upgrades will follow after the GAC project is completed, currently scheduled for late 2017. It should be noted that the Observatory Water Treatment Plant is sited on land leased to RWSA by the University of Virginia. The terms of the existing lease expire on April 17, 2021. Prior to construction of the remaining improvements, the terms of a new lease may be needed with RWSA, the City of Charlottesville and the University as participants.

4. Ragged Mountain Reservoir to Observatory Water Treatment Plant Pipeline Condition Assessment: The 18-inch Ragged Mountain and Lower Sugar Hollow raw water pipelines run in parallel to each other from the Ragged Mountain Reservoir to the Observatory Water Treatment Plant. These pipelines are constructed mostly of cast iron and are 109 and 71 years old, respectively. An assessment will provide up to date information on the condition of these pipelines and aid in planning for future conveyance of raw water from Ragged Mountain to the urban areas. This project includes using non-destructive acoustic technologies to identify existing leaks and remaining pipe wall thickness as well as to determine the remaining service life of these pipelines. This budget includes funds for the assessment as well as inspection services while the work is taking place. The technology used for this assessment is somewhat experimental and not fully proven. If the work on the first phase of pipelines, budgeted herein, proves successful, then additional pipelines such as Upper Sugar Hollow, may be added to the project in the future.
5. Interconnect Lower Sugar Hollow and Ragged Mountain Raw Water Mains: The two 18-inch water mains that supply water from Ragged Mountain Reservoir to Observatory Water Treatment Plant are 71 and 109 years old respectively. The mains are interconnected at the top of the Ragged Mountain Dam, with one serving the 1920's Royal Pump Station and the other services the more modern Stadium Road Pump Station. Both pump stations provide water to the Observatory Water Treatment Plant.

This project will serve to interconnect the two raw water lines near the Rt. 29/Fontaine Ave. intersection, which will provide improved reliability and operability in the event of raw water line breaks.

6. Sugar Hollow to Ragged Mountain Reservoir Transfer Flow Meter: The Sugar Hollow raw waterline is an 18” diameter cast iron pipeline which conveys water from Sugar Hollow Reservoir (SHR) to Ragged Mt. Reservoir (RMR). The pipe discharges directly into the RMR and can be used to supplement inflow to keep RMR at proper levels. Due to the recent expansion of the RMR, control valves on the SH pipeline near RMR were removed or abandoned beneath the expanded reservoir surface. Currently, the remaining control valve to regulate flow between the two reservoirs is located near the old Gatekeeper’s House at SH dam. The valve is a manual gate valve which requires RWSA staff to travel to SH dam in order to operate it. In addition, there is currently no flow meter equipment in place to monitor and record flow transferred between the two reservoirs. This project proposes to install a new 18” flow meter, an automatic modulating control valve, and new power and SCADA control wiring, to provide the means to regulate the flow and record data between the two reservoirs. The new equipment will be able to operate and record remotely via SCADA at other water treatment plants. This project will allow RWSA staff to efficiently and remotely maintain reservoir levels at optimal levels.

7. Sugar Hollow Dam – Rubber Crest Gate Replacement & Intake Tower Repairs: In 1998 the Sugar Hollow Dam underwent a significant upgrade to improve structural stability and spillway capacity. The original metal spillway gates were replaced with a manufactured five foot high inflatable rubber dam that is bolted to the existing concrete structure. This rubber dam allows for the normal storage of water in the reservoir with the ability to be lowered during extreme storm events. The rubber dam has an approximate service life of twenty years and is therefore now due for replacement. The aging intake tower structure will be inspected and evaluated. Recommended repairs may include issues relating to the intake gate valves and tower walls, including repair or replacement of intake trash racks, and sealing/grouting of minor concrete wall cracks.

Major System: Finished Water Storage/Transmission – Urban System

The urban finished water storage and transmission system serves to provide transmission of treated water from the three RWSA water plants (Observatory, South Rivanna, and North Rivanna Rivanna) to the distribution networks of the Albemarle County Service Authority, the City of Charlottesville, and the University of Virginia. The system includes approximately 40 miles of pipeline, six water storage tanks: Avon Street (2 MG), Pantops (5 MG), Piney Mountain. (0.7 MG), Stillhouse (0.7 MG), Observatory (3 MG), and Lewis Mountain (0.5 MG), and the Alderman Road and Stillhouse pumping stations.

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/16)	Projected Future Expenses by Year				
		As Adopted (2/23/16)	Proposed Changes	Recommended		FY17	FY18	FY19	FY20	FY21
8	Rt. 29 Pump Station Site Acquisition	\$1,900,000	(\$680,000)	\$1,220,000	\$466,416	\$753,584				
9	Valve Repair - Replacement (Phase 2)	\$500,000		\$500,000			\$250,000	\$250,000		
10	Urban Water GAC and Water Treatment Plant Improvements	\$24,925,494		\$24,925,494	\$10,107,128	\$12,000,000	\$2,818,366			
11	Stillhouse Tank Repairs and System Improvements	\$600,000		\$600,000	\$51,397	\$548,603				
12	Wholesale Water Master Metering	\$3,600,000		\$3,600,000	\$747,124	\$2,702,876	\$150,000			
13	Piney Mountain Tank Rehabilitation	\$500,000		\$500,000		\$28,000	\$412,000	\$60,000		
14	Rt. 29 Pipeline - VDOT Betterment (Rt. 29 & Berkmar)	\$3,075,000	(\$175,000)	\$2,900,000	\$1,235	\$2,898,765				
15	Avon to Pantops Water Main	\$250,000	\$5,250,000	\$5,500,000			\$750,000	\$750,000	\$1,500,000	\$2,500,000
	TOTAL	\$35,350,494	\$4,395,000	\$39,745,494	\$11,373,300	\$18,931,828	\$4,380,366	\$1,060,000	\$1,500,000	\$2,500,000

Project Descriptions:

8. Rt. 29 Pump Station Site Acquisition: This project provides site acquisition for a new Rt. 29 Pump Station and Storage Tank to be built at a later time in the general area south of Airport Road and north of Hollymead Towncenter on TMP No. 32-41 as identified in the Albemarle County Comprehensive Plan. The future pump station and tank, along with a new transmission pipeline between the proposed pump station and the South Rivanna Water Treatment Plant, will provide an interconnection between the areas presently served by the South Rivanna Water Treatment Plant and the North Rivanna Water Treatment Plant. The interconnection is needed for redundancy of service in the event of an

emergency, during drought conditions, and to adequately serve the growing needs of the 29 area generally north of the Forest Lakes subdivision.

9. Valve Repair - Replacement (Phase 2): Isolation valves are critical for normal operation of the water distribution system and timely emergency response to water main breaks. Staff continuously review results from an ongoing valve exercising and condition assessment program. This project will replace the highest-priority valves that are identified during the condition assessment as not operable and not repairable.
10. Urban Water Granular Activated Carbon and Water Treatment Improvements: The U.S. Environmental Protection Agency (EPA) regulates maximum contaminant levels (MCL) for total trihalomethanes (THMs) and haloacetic acids (HAAs) in drinking water under the Disinfectant/Disinfection Byproducts Rule (D/DBPR). In the early 1990s Stage 1 of the rule was implemented and RWSA, ACSA and the City of Charlottesville are in compliance with Stage 1. Stage 2 of the D/DBPR was to be effective for the Urban distribution system in October 2012, but the three agencies obtained a two-year extension that shifted the implementation to October 2014. The Stage 2 D/DBPR involved a major change in how THM and HAA levels are calculated and is more stringent than the Stage 1 requirements. A study concluded that complete compliance with the Stage 2 D/DBPR cannot be met consistently with minor modification of existing processes but would instead require significant capital improvements.

In July 2012, the Board decided to pursue the installation of Granular Activated Carbon (GAC) contactors to achieve Stage 2 D/DBPR compliance in the Urban System. The GAC will adsorb organic matter from the water, thereby reducing the precursors to THMs and HAAs. As decided by the Board in December 2013, the GAC systems have been sized at a lower capacity than the current rated plant capacities (the “Hybrid GAC” approach). The GAC contactors are expected to be on-line and operational by the end of 2017, after the EPA-mandated compliance date. For the interim, a Risk Reduction Plan was developed, outlining interim methods to reduce trace natural organic matter from the source water thereby reducing DBPs. This project budget includes \$631,000 to fund the capital needs of the Risk Reduction Plan. The plan includes installation of Powder Activated Carbon (PAC) feed systems at various treatment plants. The PAC treatment is adequate treatment for the new regulations in the interim time period before GAC completion. The PAC systems were completed in 2015, and are currently in operation as needed.

Also included in the Urban Water GAC project are various improvements at the South Rivanna WTP including construction of additional clearwell storage, replacement of the lime feed system, upgrades to the filter underdrains and backwash system, replacement of the filter media, sound attenuation and ventilation improvements for the high service pump station, installation of a variable frequency drive for the raw water pump station, installation of a new raw water flow meter and several improvements to the residuals management facilities. Included in the Urban Water GAC project are various improvements at the North Rivanna WTP including new filter control valves, new pump

control valves, new filter sludge removal equipment, new electrical system upgrades throughout the plant, and the installation of a surge relief mechanism.

11. Stillhouse Tank Repairs and System Improvements: The Stillhouse Mountain pressure zone currently has one ground storage tank, with a capacity of 0.70 million gallons. This project focuses on structural improvements and interior painting. Consisting of removal and replacement of the tank roof rafters, repainting of the tank interior, and other ancillary items. The project budget included design, bid-phase services, construction, and construction administration and inspection services. Construction of the tank improvements were completed fall of 2016.
12. Wholesale Water Master Metering: The January 2012, Water Cost Allocation Agreement designated how the City of Charlottesville (City) and ACSA share in the financing of the New Ragged Mountain Dam project. Within the Agreement is a general provision developed by the ACSA and City to enhance measurement of the water usage by each of the distribution agencies. In an effort to meet this obligation, the RWSA Board of Directors authorized staff in August of 2012 to complete an engineering study on metering plan alternatives. The study identified several alternatives for a metering plan based on combinations of metering and estimating methodologies. A Jurisdictional Approach was recommended which included installation of water meters at locations at the City/County corporate boundary plus one meter at each of the three urban water treatments plants. At its September 2013 meeting, the Board directed that staff proceed with the Jurisdictional Coverage Approach. The final design includes 25 remote meter locations plus the three finished water flow meters at the water treatment plants. This project budget includes preliminary and final projects design, right-of-way acquisition and negotiations, legal fees and permitting, bid-phase services, construction, and construction administration and inspection services. Construction of the 25 remote meter locations began in early 2016 and is expected to be completed in mid-2017. The three finished water flow meters were installed in 2015 as part of the Urban Water Granular Activated Carbon Project.
13. Piney Mountain Tank Rehabilitation: The 700,000 gallon Piney Mountain Tank serves the North Rivanna pressure band. A routine inspection of the Piney Mountain Tank in April of 2012 revealed several deformed roof rafters, indicating the potential for structural deficiency. An in-depth structural inspection was performed in May of 2013 and a list of recommended roof repairs provided. This project includes consultant services for design and bidding of necessary roof repairs and other ancillary items, as well as construction, construction administration, and inspection services. Long term plans for the Rt. 29 service area include the modification or elimination of this facility. The current recommended improvements are needed in order to maintain the existing tank in service for at least the next 10 years.
14. Rt. 29 Pipeline – VDOT Betterment (Rt. 29 & Berkmar): The VDOT Rt. 29 Solutions projects include widening of Rt. 29 (Seminole Trail) from a four-lane divided highway to a six-lane divided highway from Polo Grounds to Town Center Drive at Hollymead Town Center. Improvement of this 1.8 mile-long section involves significant grade changes, which VDOT has determined requires relocation of RWSA's existing 12-inch cast iron

water main for the entire length of the project. RWSA had previously identified through master planning that a 24-inch water main will be needed from the South Rivanna Water Treatment Plant to Hollymead Town Center in order to meet future water demands. RWSA has requested that VDOT and its Design-Build Contractor relocate the existing 12-inch water main as a 24-inch water main. In addition, RWSA is requesting that VDOT's contractor construct a section of 24-inch waterline adjacent to the proposed new Berkmar Drive Extension for future use. This project includes construction funds for the betterment from a 12-inch to 24-inch pipeline along the Rt. 29 Widening Project as well as design and construction of the 24-inch water main in Berkmar Drive and construction inspection services for both projects. Construction began in December and is expected to be complete by spring 2017.

15. Avon to Pantops Water Main: The southern half of the Urban Area water system is currently served by the Avon Street and Pantops storage tanks. The Avon Street tank is hydraulically well connected to the Observatory Water Treatment Plant while the Pantops tank is well connected to the South Rivanna Water Treatment Plant. The hydraulic connectivity between the two tanks, however, is less than desired, creating operational challenges and reducing system flexibility. In 1987, the City and ASCA developed the Southern Loop Agreement, outlining project phasing and cost allocations, as envisioned at the time. The first two phases of the project were constructed shortly thereafter. The third phase, known as the "Eastern Branch" is the subject of the current project. The initial funding for this project is to prepare an updated routing study and Preliminary Engineering Report to identify the scope, phasing, route and cost of the project. Additional funding is to perform design, easement acquisition and to begin construction.

Major System: South Rivanna Water System

The South Rivanna Water System is comprised of the source water, storage, conveyance and treatment infrastructure currently serving the urban area from the South Fork Rivanna River. The system includes the South Fork Rivanna Reservoir and Dam (built in 1966). The Dam is co-located with the raw water intake and pump station, as well as a small hydroelectric generation facility. The source water from the South Rivanna Reservoir is treated at the South Rivanna treatment plant (12-mgd rated capacity).

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/16)	Projected Future Expenses by Year				
		As Adopted (2/23/16)	Proposed Changes	Recommended		FY17	FY18	FY19	FY20	FY21
16	South Rivanna Hydropower Plant Decommissioning	\$2,000,000	(\$1,000,000)	\$1,000,000	\$58,552	\$250,000	\$691,448			
17	South Rivanna Water Treatment Plant Leaf Screen	\$471,000		\$471,000		\$471,000				
18	South Rivanna Water Treatment Plant Press Rehabilitation	\$150,000	\$15,242	\$165,242		\$165,242				
19	South Rivanna Water Treatment Plant Improvements	\$0	\$5,430,442	\$5,430,442			\$500,000	\$500,000	\$1,321,442	\$3,109,000
TOTAL		\$2,621,000	\$4,445,684	\$7,066,684	\$58,552	\$886,242	\$1,191,448	\$500,000	\$1,321,442	\$3,109,000

Project Descriptions:

16. South Rivanna Hydropower Plant Decommissioning: South Fork Hydropower Plant is a small hydroelectric generating facility constructed in 1987. The plant has historically operated intermittently, as river flows allow. The generated power is used at the South Rivanna Water Treatment Plant, thereby reducing power purchased off of the electric grid. During an effort to troubleshoot and repair the turbine, a large rain and lightning event caused unexpected flooding into the facility. Insurance paid damages to more recent improvements, but not the pre-existing needs to repair the turbine. Engineering investigations in 2013 associated with the failed mechanical equipment and flood event confirmed the need for further disassembly and inspection of the turbine shaft and blade linkages from a remote factory location.

Due to the complexity of possible rehabilitation, the associated Federal Energy Regulatory Commission (FERC) dam permitting, and the numerous variables in the economic analysis, proposals were solicited from national hydropower experts to initiate a feasibility study. The feasibility study began November 2015 and was conducted to determine the cost effectiveness of rehabilitating the hydropower plant while making sure to account for FERC-related costs and issues. The feasibility study was completed in May 2016 and determined that rehabilitation of the facility had a small likelihood for a positive return on investment. This conclusion was brought to the Board of Directors along with a

recommendation to initiate the surrender of the exemption to licensure and decommission the facility. The Board approved this recommendation and staff has begun coordinating with legal and engineering consultants to initiate the surrender and decommission process.

17. South Rivanna Water Treatment Plant Leaf Screen: At the South Rivanna Water Treatment Plant, the raw water pump station and intake are integral to the dam and abutments. Water flows through a bar screen and then a mechanical band screen (leaf screen) into the raw water pump station wet well. The existing leaf screen is original to the 1964-1965 construction. Historically, the mechanical screen has been quite reliable, but recently has allowed significant debris to enter and damage the raw water pumps. An evaluation of the existing leaf screen has determined that it has reached the end of its service life and needs to be replaced. Likewise, a detailed alternative analysis has determined that the most cost effective approach is to fabricate and install a replacement mechanical band screen. Design of a replacement leaf screen began in June 2016 with construction anticipated during early 2017.
18. South Rivanna Water Treatment Plant Press Rehabilitation: The South Rivanna Water Treatment Plant belt press is used to dewater sludge removed from the water treatment train. The current belt press has been in continuous operation since 1992. This project is to perform a complete factory overhaul to ensure reliable service and to preempt potential future mechanical failures.
19. South Rivanna Water Treatment Plant Improvements: The South Rivanna Water Treatment Plant is currently undergoing significant upgrades as part of the Urban Granular Activated Carbon project. Several other significant needs have also been identified and have been assembled into a single project within this Capital Plan. The projects identified herein include an expansion of the coagulant storage facilities; installation of additional filters to meet firm capacity needs; the addition of a second variable frequency drive at the Raw Water Pump Station; the relocation for the electrical gear from sub terrain location at the Sludge Pump Station, and the up fit of the office, lab, control room and storage space. These improvements are in addition to those listed above for Project No. 10 (Urban Water Granular Activated Carbon and Water Treatment Plant Improvements). Currently this facility operates at 80-90% of capacity and the identified upgrades will improve reliability and resiliency.

RURAL WATER

Major System: Crozet Water System

The Crozet Water System includes the source water, raw water conveyance, finished water treatment, transmission and storage infrastructure for the Crozet community in western Albemarle County. The source water for this system is the Beaver Creek Reservoir and Garnett Dam which was built in 1964 with a current useable storage capacity of 521 million gallons. Raw water is treated at the Crozet Water Treatment Plant (1.0 mgd rated capacity) and provides finished water to the Albemarle County Service Authority. The system includes the Crozet Elevated (Waterball) Tank (0.05 MG) for water treatment plant backwash; the Crozet Ground Storage Tank (0.5 MG) and pump station, and the Buck's Elbow Storage Tank (2.0 MG).

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/16)	Projected Future Expenses by Year				
		As Adopted (2/23/16)	Proposed Changes	Recommended		FY17	FY18	FY19	FY20	FY21
20	Beaver Creek Dam Alteration	\$6,071,000		\$6,071,000	\$133,886		\$86,000	\$235,000	\$920,000	\$4,696,114
21	Buck's Elbow & Crozet Waterball Tank Painting	\$1,055,000	\$145,000	\$1,200,000				\$60,000	\$995,000	\$145,000
22	Crozet Water GAC and Water Treatment Improvements	\$3,418,390		\$3,418,390	\$935,044	\$2,200,000	\$283,346			
23	Crozet Ground Storage Tank Repairs and Upgrades	\$351,610		\$351,610	\$30,922	\$320,688				
24	Crozet Water Treatment Plant Misc. Repairs	\$105,890		\$105,890		\$105,890				
25	Crozet Water Treatment Plant Expansion	\$250,000		\$250,000		\$100,000	\$150,000			
26	Crozet Water Treatment Plant Finished Water Pump Station	\$2,600,000		\$2,600,000		\$454,000	\$2,146,000			
27	Crozet Water System Master Plan	\$0	\$300,000	\$300,000		\$125,000	\$175,000			
	TOTAL	\$13,851,890	\$445,000	\$14,296,890	\$1,099,852	\$3,305,578	\$2,840,346	\$295,000	\$1,915,000	\$4,841,114

Project Descriptions:

20. Beaver Creek Dam Alteration: From 2008-2014 the Virginia Department of Conservation and Recreation (DCR) adopted revised *Impounding Structures Regulation* which imposed new, more rigorous, evaluations of dams within the Commonwealth. As a result, the Beaver Creek Dam has been reclassified as a high hazard dam, thereby requiring a higher

spillway design storm criteria. The higher design storm cannot be accommodated with the existing structure, and will require future modifications. This project includes investigation, preliminary design, public outreach, permitting, easement acquisition, final design, and construction of the anticipated modifications. Initial findings indicated that alterations costing approximately \$8.5M were needed. Subsequently the Virginia Soil and Water Conservation Board adopted a new Probable Maximum Precipitation (PMP) Study on December 9, 2015. In March 2016, DCR published guidance documents on implementing the new PMP Study. A revised Preliminary Engineering Report is due to DCR by June 2018.

21. Buck's Elbow & Crozet Waterball Tank Painting: The two million gallon Buck's Elbow Ground Storage Tank provides water storage for the Crozet Area while the 50,000 gallon Crozet Waterball Tank serves as filter backwash storage at the Crozet Water Treatment Plant. Routine inspections of these tanks in 2012 indicted that the tanks would require recoating by 2020. The project includes recoating of both the interior and exterior of both tanks as well as installation of an active mixing system at the Buck's Elbow Tank to decrease stratification and improve overall water quality in the Crozet area. Minor repairs and improvements to both tanks based on recommendations from the inspection report will also be included in this work. This project includes consultant services for design of project specifications, as well as construction, construction administration, and inspection services. Construction of the tank improvements are expected to begin in the spring of 2020.
22. Crozet Water Granular Activated Carbon and Water Treatment Improvements: The U.S. Environmental Protection Agency regulates maximum contaminant levels (MCL) for total trihalomethanes (THMs) and haloacetic acids (HAAs) in drinking water under the Disinfectant/Disinfection Byproducts Rule (D/DBPR). In the early 1990s Stage 1 of the rule was implemented and RWSA and ACSA are in compliance with Stage 1. Stage 2 of the D/DBPR would normally be effective for the Crozet distribution system in November 2014; however, a two-year extension was granted by Virginia Department of Health and Stage 2 became effective for Crozet in November 2016. The Stage 2 D/DBPR involved a major change in how THM and HAA levels are calculated and is more stringent than the Stage 1 requirements. A study concluded that complete compliance with the Stage 2 D/DBPR cannot be continuously met with minor modification of existing processes (water production facilities combined with ASCA distribution system) but would instead require significant capital improvements.

For the Crozet water system, installation of granular activated carbon (GAC) contactor units was selected due to the start/stop operation of the water treatment plant and the relatively higher water age in the distribution system. The GAC will adsorb organic matter from the water, thereby reducing the precursors to THMs and HAAs.

The project award was approved by the RWSA Board of Directors at the March 24, 2015 Board Meeting. Included in the Crozet WTP GAC project are various improvements including upgrade of the chlorine feed system to a modern hypochlorite feed system and installation of a finished water flow meter with appurtenances, as well as replacing the

existing fluoride and corrosion inhibitor chemical feed systems. The new chemical feed systems will be housed in additional rooms in the proposed GAC contactor building. This new location will also allow for shorter chemical feed lines.

23. Crozet Ground Storage Tank Repairs and Upgrades: The 500,000 gallon Crozet Ground Storage Tank serves as the wet well for the finished water pumps at the Crozet Water Treatment Plant as well as one of two water storage tanks in the Crozet Service Area. A routine inspection of the Crozet Tank in April of 2012 revealed several deformed roof rafters, indicating the potential for structural deficiency. An in-depth structural inspection was performed in January 2013 and a list of recommended roof repairs provided. In addition to the structural repairs and other ancillary work, the project also included repainting of the tank interior and installation of an active mixing system to improve system-wide water quality by increasing circulation and minimizing tank stratification. The project budget included consultant services for design and bidding of necessary roof repairs and other ancillary items, as well as construction, construction administration, and inspection services. Construction of the tank improvements began in the spring of 2016 and was completed in the summer of 2016.
24. Crozet Water Treatment Plant Miscellaneous Repairs: Staff identified several repairs needed within the Crozet water system within the next two years. These items have been consolidated into a single project and include new stem guides, valves and trash racks at the raw water pump station, a new backwash supply pump, a new overflow pipe for the backwash tank, and new walkways and handrails.
25. Crozet Water Treatment Plant Expansion: The Crozet water treatment system is currently permitted and rated to supply up to 1.0 million gallons per day (mgd) of water to the ACSA distribution system. Over the past several years, average day usage of water has increased steadily, with maximum day demand approaching plant capacity. The current lease agreement with ACSA for land at this facility stipulates that a 5-year notice must be given prior to altering or terminating the lease. As such, it is imperative that RWSA begin evaluating how a future plant expansion would be accomplished and any impacts on the ACSA lease.

Expanding the plant capacity at Crozet WTP would require a modification to the water withdrawal permit, and could include possible stream release requirements. In order to fully analyze all aspects of the design required for this project, and honor plant upgrade notification requirements to ACSA, select elements of the preliminary design have been started. These elements include a Preliminary Engineering report (PER), plant field testing, and preliminary permitting work and coordination with pertinent regulators.

26. Crozet Water Treatment Plant Finished Water Pump Station: As noted in the above project description, the Crozet water treatment facilities will require an expansion to secure future needs of the Crozet community. The Finished Water Pump Station is the final step in the treatment and conveyance process. The Crozet Pump Station is original to the plant and has numerous design and operational flaws that severely limit its operational reliability. A new pump station at the site is required for both current and

future service needs. The project includes evaluation, permitting, design, construction and construction management. The project is anticipated to start construction mid-2017.

27. Crozet Water System Master Plan: The Crozet water service area continues to see expanded growth in the average and maximum day demand. Discussions with Albemarle County planning staff and ACSA have confirmed recent growth trends and indicate that the rate of growth in Crozet is increasing. While several projects are currently underway to address the immediate need in Crozet, it is now necessary to develop a comprehensive mid and long range plan for the entire water system including; raw water supply; raw water pumping and conveyance; finished water treatment; finished water pumping, and finished water distribution and storage.

Major System: Scottsville Water System

The Scottsville Water System is comprised of the raw water conveyance, finished water treatment, transmission and storage infrastructure for the Town of Scottsville in southern Albemarle County. The source water for this system is the Totier Creek Intake, and the backup supply is the Totier Creek Reservoir, which was built in 1971 with a current useable capacity of 182 million gallons. Raw water is treated at the Scottsville Water Treatment Plant (0.25 mgd rated capacity) and provides finished water to the Albemarle County Service Authority. The system includes the Scottsville Storage Tank (0.25 MG).

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/16)	Projected Future Expenses by Year				
		As Adopted (2/23/16)	Proposed Changes	Recommended		FY17	FY18	FY19	FY20	FY21
28	Scottsville Water Granular Activated Carbon	\$1,615,000		\$1,615,000	\$330,665	\$910,000	\$374,334			
29	Scottsville High Service Pump Station Upgrades	\$100,000		\$100,000				\$100,000		
	TOTAL	\$1,715,000	\$0	\$1,715,000	\$330,665	\$910,000	\$374,334	\$100,000	\$0	\$0

Project Descriptions:

28. Scottsville Water Granular Activated Carbon: The U.S. Environmental Protection Agency regulates maximum contaminant levels (MCL) for total trihalomethanes (THMs) and haloacetic acids (HAAs) in drinking water under the Disinfectant/Disinfection Byproducts Rule (D/DBPR). In the early 1990s Stage 1 of the rule was implemented and RWSA and ACSA are in compliance with Stage 1. Stage 2 of the D/DBPR was effective for the Scottsville distribution system in November 2014. The Stage 2 D/DBPR involved a major change in how THM and HAA levels are calculated and are more stringent than the Stage 1 requirements. After a study, it was concluded that complete compliance with the Stage 2 D/DBPR cannot consistently be met with minor modification of existing processes (water production facilities combined with ASCA distribution system) but would instead require significant capital improvements.

For the Scottsville water system, installation of granular activated carbon (GAC) contactor units was selected due to the start/stop operation of the water treatment plant and the higher water age in the distribution system. The GAC will adsorb organic matter from the water, thereby reducing the precursors to THMs and HAAs. Ulliman Schutte Construction, LLC began the overall GAC project work at South Rivanna WTP in April 2015, mobilized to the Scottsville WTP site in May 2016, and is scheduled to complete Scottsville work before the end of 2017.

29. Scottsville High Service Pump Station Upgrades: Currently, the high service pumps at the Scottsville water treatment plant pump water to the RWSA Scottsville Storage Tank and then an ACSA booster station pumps water to the ACSA tank, which serves the majority of the Scottsville service area. This project will evaluate and replace the high

service pumps at the Scottsville WTP so that water can be pumped directly from the WTP to the ACSA tank, eliminating the need for the ACSA booster pump station and the RWSA Scottsville Storage Tank. The revised setup will increase reliability, be more efficient, and reduce water age in the distribution system.

URBAN WASTEWATER

Major System: Wastewater Interceptors/Pumping Stations

The RWSA wastewater interceptors and pumping stations serve to convey wastewater from the collection systems of the City of Charlottesville and Albemarle County Service Authority to the Moores Creek Advanced Water Resource Recovery Facility (MCAWRRF). This grouping includes: the Crozet Interceptor and four associated pumping stations; the Moores Creek Interceptor and Relief Sewer; the Morey Creek, Maury Hills, Powell Creek, Meadow Creek, Schenks Branch, Woodbrook and Rivanna Interceptors; as well as the Albemarle-Berkley Interceptor and associated Albemarle Pumping Station. Also included in this system are the two primary pump stations into the MCAWRRF, the Rivanna and Moores Creek Pump Stations.

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/16)	Projected Future Expenses by Year				
		As Adopted (2/23/16)	Proposed Changes	Recommended		FY17	FY18	FY19	FY20	FY21
30	Upper Schenks Branch Interceptor	\$9,014,760	(\$2,346,825)	\$6,667,935	\$626,471	\$1,764,464	\$1,332,000	\$2,945,000		
31	Rivanna Pump Station and Tunnel	\$33,300,000	(\$1,100,000)	\$32,200,000	\$22,502,522	\$8,120,478	\$1,577,000			
32	Interceptor Sewer and Manhole Repair	\$1,337,389		\$1,337,389	\$123,330	\$91,000	\$282,000	\$242,000	\$300,000	\$299,059
33	Crozet Interceptor Sewer and Manhole Repair	\$625,000		\$625,000	\$180,715	\$6,000	\$76,000	\$142,000	\$220,285	
34	Crozet Flow Equalization Tank	\$2,325,000	\$1,420,000	\$3,745,000		\$73,000	\$436,000	\$3,236,000		
35	Crozet Interceptor Pump Station Automatic Bar Screens	\$75,000		\$75,000			\$75,000			
36	Crozet Interceptor Pump Stations Bypass Isolation Valves	\$220,000	\$500,000	\$720,000		\$52,500	\$495,000	\$172,500		
	TOTAL	\$46,897,149	(\$1,526,825)	\$45,370,324	\$23,433,038	\$10,107,442	\$4,273,000	\$6,737,500	\$520,285	\$299,059

Project Descriptions:

30. Upper Schenks Branch Interceptor: The Schenks Branch Interceptor is located in the eastern part of the City of Charlottesville and ties into the Meadowcreek Interceptor. The interceptor was constructed in the mid-1950s of 21-inch clay and concrete pipe. The existing interceptor is undersized to serve present and future wet weather flows as determined by the City, and is to be upgraded to 30-inch pipe. The Upper Schenks Branch

Interceptor consists of two sections along McIntire Road. Both of these sections have been designed with the first phase of this project located in the City's Schenks Branch Greenway, completed in early 2016. Installation of the remaining landscaping will be completed in fall of 2017. The second phase of the Upper Schenks Interceptor will be replaced by RWSA in coordination with the City of Charlottesville's sewer upgrades once easement negotiations with Albemarle County are complete (or the City authorizes the second phase project be constructed under McIntire Road). Project costs include design, permitting, easement acquisition, construction, construction observation/administration by the engineering consultant; and project contingencies.

31. Rivanna Pump Station and Tunnel: Pumping capacity between the Rivanna Interceptor in Riverview Park and the Moores Creek Advanced Water Resource Recovery Facility requires expansion for wet weather peak flow, from a current capacity of 24.5 mgd to a firm capacity of 53 mgd in accordance with RWSA's DEQ Consent Order. Following a lengthy public process and study of alternatives, the RWSA Board selected to move forward with a final design in December 2011. The project includes construction of approximately 1,620 linear feet of a tunnel with a tunnel-boring machine which will connect the existing Rivanna Interceptor in Riverview Park to a new pump station located on the RWSA MCAWRRF property. The final design included pumps capable of delivering a peak pumping rate equivalent to 53 mgd, electrical gear, influent grinders, self-cleaning wet well, air collection for odor control, back-up power generation, SCADA control and integration, tie-ins to the existing systems, site and permitting work, storage building demolition and electrical relocation work, as well as architectural, structural and mechanical systems. The existing pump station at the entrance to Riverview Park will be demolished once the new pump station and tunnel are complete and in service. Bidding was held in November 2013 and the project was awarded in December 2013. Construction began in March 2014 and is anticipated to be completed in late summer 2017.
32. Interceptor Sewer and Manhole Repair: This project is used to conduct assessment of various interceptors as well as rehabilitation of interceptors that do not have a separate CIP project. Planned projects include condition assessments and assumed rehabilitation of the Morey Creek Interceptor and Powell Creek Interceptor as well as rehabilitation efforts identified for the Moores Creek Interceptor, Moores Creek Relief Interceptor, and Maury Hill Branch Sewer that have been identified from previous condition assessment efforts. This project will also provide an allowance in budgeted funds to carry out future repairs. The intent of this project is to complete a condition assessment of all RWSA interceptors (except those replaced during the period with new pipe) and perform as-needed rehabilitation work by 2020. Such periodic assessments of all sewer pipe reflects industry best practices and the maintenance expectations of federal and state regulators as a part of avoiding sanitary sewer overflows.
33. Crozet Interceptor Sewer and Manhole Repairs: The Crozet Interceptor is located in western Albemarle County and serves the Crozet area. Flow metering indicates that the interceptor experiences substantial inflow and infiltration and requires rehabilitation. In order to minimize future infrastructure improvements, ACSA and RWSA have agreed to aggressively rehabilitate this interceptor and the sewers that flow to the interceptor. The

initial phase of rehabilitation to repair defects in manholes and pipelines contributing to the inflow and infiltration in the interceptor upstream of Crozet Pump Station No. 4 has been completed. The current budget accounts for condition assessment work and assumed rehabilitation needs for the lower portions of the interceptor. While wet weather flows have moderately improved based on the initial phase of work, the ACSA and RWSA continue to investigate and remediate deficiencies along the entire interceptor.

34. Crozet Flow Equalization Tank: Rehabilitation work in the RWSA and ACSA sewer systems is on-going to meet the I&I reduction goals in the Crozet Interceptor. This is based on the flow metering and modeling results of the Comprehensive Sanitary Sewer Model & Study conducted in 2006 and as part of the Crozet Interceptor CIP project. The results of the 2006 study were updated in 2016 to evaluate I/I reduction goals and future capital project needs. The need to proceed with construction of a flow equalization tank in the Crozet area was confirmed as a result of this study update, which will take into account recent flow monitoring data that had been collected following previous I/I reduction efforts. Based on those results, a preliminary engineering evaluation of a flow equalization tank upstream of Crozet Pump Station No. 4 has begun. Progressing into the preliminary engineering phase of the flow equalization tank is necessary to ensure that the facility can be sited, designed, permitted, constructed and ready for operation by 2020 in order to meet the two-year storm flow targets. The budget for this project includes estimates for the preliminary engineering, final design, property acquisition, legal assistance, construction costs and construction management services.
35. Crozet Interceptor Pump Station Automatic Bar Screens: There are currently two automatic bar screens at Crozet Pump Station No. 4. These units were original to the pump station which was constructed in the mid-1980s. Prior to 2014, one of the units was operational, with the second unit no longer serviceable. The first screen was replaced as part of the CIP in 2014. This project involves replacement of the second unit.
36. Crozet Interceptor Pump Station Bypass Isolation Valves: There are four pump stations located in the Crozet Interceptor system that help convey the flow from the Crozet area into the Morey Creek Interceptor and the rest of the urban collection system. These pump stations were constructed in the 1980s and provided no means of isolating each pump station from its downstream force main. This condition complicates maintenance-related activities as each time a pump station component needs to be serviced or replaced, the volume of wastewater within the force main must be addressed at the pump station as it drains back to the wet well. In addition, the Crozet Interceptor Pump Stations also have limited storage within their wet wells, and any reduction of down time as a result of dealing with the impacts of no isolation valves, decreases the amount of time available to work on the equipment. In order to alleviate this condition, temporary valves called “line stops” will be temporarily installed on the force mains downstream of the pump stations to allow enough time for a new isolation valve to be installed. This isolation valve location will provide the maximum amount of down time available based on current system conditions for future pump station maintenance activities. While line stops are in place, bypass connections will also be provided at each pump station. These will allow staff the

option of bringing in bypass pumps for more significant pump station shutdowns required for maintenance activities or repairs that the isolation valves alone cannot account for.

Major System: Moores Creek Advanced Water Resource Recovery Facility

The Moores Creek Advanced Water Resource Recovery Facility (MCAWRRF) is the largest wastewater treatment facility within the RWSA system. The plant was originally constructed in 1958 and upgraded and expanded in 1981 and 1982, and currently has a rated capacity of 15 mgd. From 2009 thru 2012 the facility was upgraded to provide enhanced nutrient removal, and increased wet weather pumping and treatment capacity. This site includes the infrastructure for the wastewater treatment process as well as the RWSA administration facilities.

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/16)	Projected Future Expenses by Year				
		As Adopted (2/23/16)	Proposed Changes	Recommended		FY17	FY18	FY19	FY20	FY21
37	Bridge Repairs	\$330,000		\$330,000	\$30,741	\$209,259	\$90,000			
38	MCAWRRF Administration Building Repairs	\$450,000	(\$365,254)	\$84,746		\$84,746				
39	MCAWRRF Odor Control Phase 2	\$9,847,000	\$261,000	\$10,108,000	\$927,380	\$5,367,248	\$3,813,372			
40	MCAWRRF Roof Replacements	\$903,000	\$361,000	\$1,264,000		\$190,000	\$678,000	\$396,000		
41	MCAWRRF Second Centrifuge	\$1,025,000	\$265,000	\$1,290,000	\$12,399	\$677,601	\$600,000			
	TOTAL	\$12,555,000	\$521,746	\$13,076,746	\$970,520	\$6,528,854	\$5,181,372	\$396,000	\$0	\$0

Project Descriptions:

37. Bridge Repairs: The bridge crossing Moores Creek located at the Advanced Water Resource Recovery Facility was constructed in the early 1980s. In late 2011, staff commissioned a detailed inspection of the bridge. The inspection results indicated that the bridge was in good condition, but required maintenance repairs to assure continued safe operation. This work includes sealing the expansion joints, scupper installation to drain the bridge deck, new concrete overlay topping, repairs to the steel plate girders and their bearings, catwalk and steel corrosion repair and repainting, and minor concrete repair. This work will be completed in conjunction with the Moores Creek Odor Control Improvements project.

38. Moores Creek AWRRF Administration Building Repairs: The RWSA Administration Building was constructed in 1978 as part of the Moores Creek wastewater treatment facility, with the addition of an elevator and office space in 1995. Over the past several years there have been several significant building maintenance issues. As a result, in October 2012, staff commissioned an architectural, mechanical, electrical, and plumbing evaluation of the building, which identified several near, mid, and long-term repair needs. This project included the replacement of the entire roof with a standing seam

aluminum material, gutter and downspout replacement, electrical circuit mapping and rewiring, window replacement, and building exterior painting which have been capitalized via completed projects. Several small items remain to be completed within this budget.

39. Moore's Creek AWWRF Odor Control Phase 2: As part of the implementation of the next phase of the 2007 Odor Control Master Plan at the MCAWWRF, operations audits were performed, liquid and vapor phase sampling was conducted, and a computerized dispersion model was developed from 2013 to 2014. Recommendations for odor control improvements that would significantly control odors from traveling beyond the MCAWWRF fence line were presented to the RWSA Board of Directors in December 2014 and the CIP project for \$9.33M was approved at the January 2015 Meeting. The budget was later increased to \$9.85M. The final design for odor control improvements includes covering the head works and screening channels, installing grit facilities, constructing a bypass line through one equalization basin, covering the primary clarifiers, building additional odor scrubbing facilities to treat the foul air from the covered sources, removing the post-digestion clarifiers from service, modifying the handling, hauling and storage of bio solids, cleaning the equalization basins and holding ponds, and coating the interior of the digesters. The design for the Odor Control Improvements Project was completed in November 2015. An award of construction contract and associated engineering construction administration and inspection occurred in April 2016. Final project completion is expected in January 2018. The digester coating and basin cleaning projects will be managed by RWSA staff through separate contracts.
40. Moore's Creek AWWRF Roof Replacements: The majority of the buildings at the Moore's Creek Advanced Water Resource Recovery Facility were constructed in 1981 and 1982 during a major expansion of the existing treatment plant. All buildings constructed at that time were built with a metal roof system. In 2014, deficiencies were identified in the roof at the Administration Building and the roof was replaced. The materials of the original roof at the Administration Building are the same as the roof material on the other buildings. Likewise, many of the buildings have started to experience leaks and structural deficiencies. As a result, the purpose of this project is to replace the roof systems at the following buildings at the Moore's Creek AWWRF: Blower Building, Moore's Creek Pump Station, Sludge Pump Station No. 2, Maintenance Building 1, and Maintenance Building 2. Following additional review of the conditions of various buildings located at the Moore's Creek AWWRF, this project also now includes replacement of the roof systems Sludge Pumping Building, the Primary Pump Building, and the Effluent Pump Building. Design of these improvements will begin in early 2017.
41. Moore's Creek AWWRF Second Centrifuge: The Moore's Creek AWWRF currently operates a high-speed centrifuge to process and dewater digested bio solids from the treatment process. The centrifuge was constructed during the 2009-2012 Nutrient Upgrade project and served to replace an older plate and frame filter press operation (which was removed during installation of the centrifuge), with a second plate and frame press serving as backup. An evaluation of the remaining filter press concluded that extensive repairs would be required to maintain this as a backup dewatering system and the repairs would not be cost-effective as purchasing a second centrifuge. Without the

utility of the second press the facility does not have a redundant process, and thus during planned or emergency outages a portable back-up unit must be rented or leased. A second centrifuge will allow for continued bio solids dewatering during planned or emergency repairs to one of the two centrifuges, for higher-rate processing by operating both units simultaneously during other periods (thus saving on staff time), and for better maintenance of proper solids flow through the plant.

RURAL WASTEWATER

Major System: Scottsville Wastewater System

The Scottsville Wastewater System includes the influent pumping station, the water resource recovery facility constructed in 1983, and the historical treatment lagoon (now incorporated into the plant operation). The water resource recovery facility has a rated capacity of 0.2 mgd.

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/16)	Projected Future Expenses by Year				
		As Adopted (2/23/16)	Proposed Changes	Recommended		FY17	FY18	FY19	FY20	FY21
	No projects anticipated in current 5 year plan									
	TOTAL									

Project Descriptions:

No capital improvement projects are envisioned for this system during the next 5 years.

Major System: Glenmore Wastewater System

The 0.381-mgd water resource recovery facility, located within the Glenmore subdivision, is operated by RWSA. The facility includes an influent pumping station located immediately adjacent to the treatment facility.

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/16)	Projected Future Expenses by Year				
		As Adopted (2/23/16)	Proposed Changes	Recommended		FY17	FY18	FY19	FY20	FY21
42	Glenmore WRRF Influent Pump & VFD Addition		\$61,000	\$61,000						\$61,000
	TOTAL		\$61,000	\$61,000						\$61,000

Project Descriptions:

42. Glenmore WRRF Influent Pump & VFD Addition: The Glenmore WRRF is predicted to see additional dry and wet weather flows as construction within the service area continues. Future wet weather flows will require higher influent pumping capacity and an additional pump and electrical variable frequency drive will be required to maintain firm capacity.

Major System: All Systems

No.	Project Description	Five-Year Capital Program			Previous Expenditures	Projected Future Expenses by Year				
		As Adopted (2/23/16)	Proposed Changes	Recommended		FY17	FY18	FY19	FY20	FY21
43	Radio Upgrades	\$500,000	\$21,000	\$521,000		\$521,000				
	TOTAL	\$500,000	\$21,000	\$521,000		\$521,000				

Project Descriptions:

43. Radio Upgrades: The regional 800 MHz Public Safety Communication System, in which the Rivanna Water and Sewer Authority participates to provide internal and emergency radio communication, is expected to reach the end of its service life in 2018. Because of technology changes (software and hardware) the Charlottesville-UVA-Albemarle County Emergency Communications Center (ECC) will need to upgrade or replace the system to keep it useable. This project plans for the upgrade or replacement of major technology components and equipment of the existing system include: electronic components at all tower sites and the prime site at the ECC facility; new console equipment at the regional ECC; equipment such as tower site generators and UPS systems; an additional tower site (to improve service in southern Albemarle County); microwave backbone; and replacement of the system recording facilities. The project will take 24 months to complete and will be completed in Fiscal Year 2018. RWSA is being apportioned a part of the \$18.8M project cost proportionately based on the number of radios (2.4% of the total project cost). In addition to this assessment from the ECC, the Authority will also be required to undertake programing upgrades to its fleet of stationary, mobile, and portable radios.

APPENDICES

CIP Financial Summary

Water System Summary

Wastewater System Summary

CIP FINANCIAL SUMMARY

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/16)	Projected Future Expenses by Year				
		As Adopted (2/23/16)	Proposed Changes	Recommended		FY17	FY18	FY19	FY20	FY21
1	South Fork Rivanna Reservoir to RM Reservoir Pipeline Right-of-Way	\$2,295,000		\$2,295,000	\$25,249		\$1,000,000	\$669,193	\$600,558	
2	South Fork Rivanna Reservoir Dredging	\$3,500,000	(\$3,362,442)	\$137,558	\$127,558					\$10,000
3	Observatory Water Treatment Plant Improvements	\$9,500,000	\$500,000	\$10,000,000	\$422,979	\$768,021	\$315,000	\$1,795,000	\$5,384,000	\$1,315,000
4	RM Reservoir to OWTP Pipeline Condition Assessment	\$285,000		\$285,000					\$285,000	
5	Interconnect Lower SH and RM Raw Water Mains	\$0	\$225,000	\$225,000			\$39,000	\$186,000		
6	Sugar Hollow to Ragged Mountain Reservoir Transfer Flow Meter	\$0	\$150,000	\$150,000		\$150,000				
7	Sugar Hollow Dam - Rubber Crest Gate Replacement & Intake Tower Repairs	\$0	\$940,000	\$940,000				\$55,000	\$473,000	\$412,000
8	Rt. 29 Pump Station Site Acquisition	\$1,900,000	(\$680,000)	\$1,220,000	\$466,416	\$753,584				
9	Valve Repair - Replacement (Phase 2)	\$500,000		\$500,000			\$250,000	\$250,000		
10	Urban GAC and Water Treatment Plant Improvements	\$24,925,494		\$24,925,494	\$10,107,128	\$12,000,000	\$2,818,366			
11	Stillhouse Tank Repairs and System Improvements	\$600,000		\$600,000	\$51,397	\$548,603				
12	Wholesale Water Master Metering	\$3,600,000		\$3,600,000	\$747,124	\$2,702,876	\$150,000			
13	Piney Mtn Tank Rehabilitation	\$500,000		\$500,000		\$28,000	\$412,000	\$60,000		
14	Rt. 29 Pipeline - VDOT Betterment (Rt. 29 & Berkmar)	\$3,075,000	(\$175,000)	\$2,900,000	\$1,235	\$2,898,765				
15	Avon to Pantops Water Main	\$250,000	\$5,250,000	\$5,500,000			\$750,000	\$750,000	\$1,500,000	\$2,500,000
16	South Rivanna Hydropower Plant Decommissioning	\$2,000,000	(\$1,000,000)	\$1,000,000	\$58,552	\$250,000	\$691,448			
17	South Rivanna WTP Leaf Screen	\$471,000		\$471,000		\$471,000				
18	South Rivanna WTP Filter Press Rehabilitation	\$150,000	\$15,242	\$165,242		\$165,242				
19	South Rivanna WTP Improvements	\$0	\$5,430,442	\$5,430,442			\$500,000	\$500,000	\$1,321,442	\$3,109,000

CIP FINANCIAL SUMMARY

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/16)	Projected Future Expenses by Year				
		As Adopted (2/23/16)	Proposed Changes	Recommended		FY17	FY18	FY19	FY20	FY21
20	Beaver Creek Dam Alteration	\$6,071,000		\$6,071,000	\$133,886		\$86,000	\$235,000	\$920,000	\$4,696,114
21	Buck's Elbow & Crozet Waterball Tank Painting	\$1,055,000	\$145,000	\$1,200,000				\$60,000	\$995,000	\$145,000
22	Crozet Water GAC and Water Treatment Improvements	\$3,418,390		\$3,418,390	\$935,044	\$2,200,000	\$283,346			
23	Crozet Ground Storage Tank Repairs & Upgrades	\$351,610		\$351,610	\$30,922	\$320,688				
24	Crozet WTP Miscellaneous Repairs	\$105,890		\$105,890		\$105,890				
25	Crozet WTP Expansion	\$250,000		\$250,000		\$100,000	\$150,000			
26	Crozet WTP Finished Water Pump Station	\$2,600,000		\$2,600,000		\$454,000	\$2,146,000			
27	Crozet Water System Master Plan	\$0	\$300,000	\$300,000		\$125,000	\$175,000			
28	Scottsville Water Granular Activated Carbon	\$1,615,000		\$1,615,000	\$330,665	\$910,000	\$374,334			
29	Scottsville High Service Pump Station Upgrades	\$100,000		\$100,000				\$100,000		
30	Upper Schenks Branch Interceptor	\$9,014,760	(\$2,346,825)	\$6,667,935	\$626,471	\$1,764,464	\$1,332,000	\$2,945,000		
31	Rivanna Pump Station and Tunnel	\$33,300,000	(\$1,100,000)	\$32,200,000	\$22,502,522	\$8,120,478	\$1,577,000			
32	Interceptor Sewer & Manhole Repair	\$1,337,389		\$1,337,389	\$123,330	\$91,000	\$282,000	\$242,000	\$300,000	\$299,059
33	Crozet Interceptor Sewer & Manhole Repair	\$625,000		\$625,000	\$180,715	\$6,000	\$76,000	\$142,000	\$220,285	
34	Crozet Flow Equalization Tank	\$2,325,000	\$1,420,000	\$3,745,000		\$73,000	\$436,000	\$3,236,000		
35	Crozet Interceptor PS Automatic Bar Screens	\$75,000		\$75,000			\$75,000			
36	Crozet Interceptor Pump Stations Bypass Isolation Valves	\$220,000	\$500,000	\$720,000		\$52,500	\$495,000	\$172,500		
37	Bridge Repairs	\$330,000		\$330,000	\$30,741	\$209,259	\$90,000			
38	MCAWRRF Administration Building Repairs	\$450,000	(\$365,254)	\$84,746		\$84,746				

CIP FINANCIAL SUMMARY

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/16)	Projected Future Expenses by Year				
		As Adopted (2/23/16)	Proposed Changes	Recommended		FY17	FY18	FY19	FY20	FY21
39	MCAWRRF Odor Control Phase 2	\$9,847,000	\$261,000	\$10,108,000	\$927,380	\$5,367,248	\$3,813,372			
40	MCAWRRF Roof Replacements	\$903,000	\$361,000	\$1,264,000		\$190,000	\$678,000	\$396,000		
41	MCAWRRF Second Centrifuge	\$1,025,000	\$265,000	\$1,290,000	\$12,399	\$677,601	\$600,000			
42	Glenmore WRRF Influent Pump & VFD Addition	\$0	\$61,000	\$61,000						\$61,000
43	Radio Upgrades	\$500,000	\$21,000	\$521,000		\$521,000				
	Total	\$129,070,533	\$6,815,163	\$135,885,696	\$37,841,713	\$42,108,965	\$19,594,866	\$11,793,693	\$11,999,285	\$12,547,173

WATER SYSTEM SUMMARY

Urban Water System	Five-Year Capital Program			Previous Expensed	Projected Future Expenses by Year				
	As Adopted 2/2016	Proposed Changes	Recommended		FY17	FY18	FY19	FY20	FY21
PROJECT COSTS									
Community Water Supply Plan	\$ 5,795,000	\$ (3,362,442)	\$ 2,432,558	\$ 152,807	\$ -	\$ 1,000,000	\$ 669,193	\$ 600,558	\$ 10,000
Observatory WTP and Ragged Mtn/Sugar Hollow Reservoir System	9,785,000	1,815,000	11,600,000	422,979	918,021	354,000	2,036,000	6,142,000	1,727,000
Finished Water Storage/Distribution - Urban System	35,350,494	4,395,000	39,745,494	11,373,300	18,931,828	4,380,366	1,060,000	1,500,000	2,500,000
South & North Fork Rivanna WTP and Reservoir System	2,621,000	4,445,684	7,066,684	58,552	886,242	1,191,448	500,000	1,321,442	3,109,000
Total Projects Urban Water Systems	\$53,551,494	\$7,293,242	\$ 60,844,736	\$ 12,007,638	\$ 20,736,091	\$ 6,925,814	\$ 4,265,193	\$ 9,564,000	\$ 7,346,000
FUNDING SOURCES URBAN SYSTEM - TO DATE									
Debt Proceeds used & available 2015B Bond			\$ 27,340,900	\$ 10,685,200	\$ 14,700,000	\$ 1,955,700	\$ -	\$ -	\$ -
Capital Cash used			1,322,438	1,322,438	-	-	-	-	-
SUBTOTAL			28,663,338	12,007,638	14,700,000	\$1,955,700	\$0	\$0	\$0
FUNDING SOURCES URBAN SYSTEM - NEEDS									
Capital Cash on hand/available			\$ 5,300,000	\$ -	\$ 4,836,091	\$ 463,909			
Future Cash reserve transfer to Capital Fund			5,700,000		1,200,000	1,500,000	1,000,000	1,000,000	1,000,000
New Debt Needed			21,181,398		-	3,006,205	3,265,193	8,564,000	6,346,000
SUBTOTAL			32,181,398		6,036,091	4,970,114	4,265,193	9,564,000	7,346,000
TOTAL URBAN WATER FUNDING			\$ 60,844,736	\$ 12,007,638	\$ 20,736,091	\$ 6,925,814	\$ 4,265,193	\$ 9,564,000	\$ 7,346,000
Estimated Bond Issues			\$ 21,181,398			\$ 6,271,398		\$ 14,910,000	

Rural Water System	Five-Year Capital Program			Previous Expensed	Projected Future Expenses by Year				
	As Adopted 2/2016	Proposed Changes	Recommended		FY17	FY18	FY19	FY20	FY21
PROJECT COSTS									
Crozet Water System	\$ 13,851,890	\$ 445,000	\$ 14,296,890	\$ 1,099,852	\$ 3,305,578	\$ 2,840,346	\$ 295,000	\$ 1,915,000	\$ 4,841,114
Scottsville Water System	1,715,000	-	1,715,000	330,665	910,000	374,335	100,000	-	-
Total Rural Water Systems	\$15,566,890	\$445,000	\$ 16,011,890	\$ 1,430,517	\$ 4,215,578	\$ 3,214,681	\$ 395,000	\$ 1,915,000	\$ 4,841,114
FUNDING SOURCES RURAL SYSTEM - NEEDS									
Cash used & available			\$ 447,438	\$ 8,438	\$ 339,000	\$ 100,000			
Debt Proceeds 2012A Bond			2,756,798	1,394,767	\$ 1,362,031				
Debt Proceeds 2015B Bond			2,389,312	27,312	\$ 2,362,000				
			-	-	\$ -	-			
			-	-	\$ -	-			
New Debt Needed			10,418,342		152,547	3,114,681	395,000	1,915,000	4,841,114
TOTAL RURAL WATER FUNDING			\$ 16,011,890	\$ 1,430,517	\$ 4,215,578	\$ 3,214,681	\$ 395,000	\$ 1,915,000	\$ 4,841,114
Estimated Bond Issues			\$ 10,418,342			\$ 3,267,228	\$ 2,310,000		\$ 4,841,114

WASTEWATER SYSTEM SUMMARY

Wastewater System	Five-Year Capital Program				Projected Future Expenses by Year				
	As Adopted 2/2016	Proposed Changes	Recommended	Previous Expensed	FY17	FY18	FY19	FY20	FY21
PROJECT COSTS									
Wastewater Interceptor/Pumping Stations	\$ 46,897,149	\$ (1,526,825)	\$ 45,370,324	\$ 23,433,038	\$ 10,107,442	\$ 4,273,000	\$ 6,737,500	\$ 520,285	\$ 299,059
Moore's Creek AWWRF	13,055,000	542,746	13,597,746	970,520	7,049,854	5,181,372	396,000	-	-
Total Urban Wastewater Systems	\$59,952,149	-\$984,079	\$ 58,968,070	\$ 24,403,558	\$ 17,157,296	\$ 9,454,372	\$ 7,133,500	\$ 520,285	\$ 299,059
FUNDING SOURCES URBAN SYSTEM - TO DATE									
Debt Proceeds Used			\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Debt Proceeds - 2012A			2,739,400	1,756,400	530,000	\$453,000	-	-	-
Debt Proceeds - 2014A			29,047,920	19,677,920	8,000,000	\$1,370,000	-	-	-
Debt Proceeds - 2015A			1,189,671	620,776	568,895	\$0	-	-	-
Capital Cash used			2,348,462	2,348,462	-	-	-	-	-
SUBTOTAL			35,325,453	24,403,558	9,098,895	1,823,000	-	-	-
FUNDING SOURCES URBAN SYSTEM - NEEDS									
Capital Cash on hand/available			\$ 3,943,421	\$ 2,658,401	\$ 1,285,020	\$ 1,285,020	-	-	-
2016 Bond			9,950,000	\$ 5,400,000	\$ 4,550,000	\$ 4,550,000	-	-	-
Future Cash reserve transfer to Capital Fund			2,069,344	-	-	500,000	\$750,000	\$ 520,285	\$299,059
New Debt Needed			7,679,852	-	-	1,296,352	6,383,500	-	-
SUBTOTAL			23,642,617	8,058,401	8,058,401	7,631,372	7,133,500	520,285	299,059
TOTAL URBAN WASTEWATER FUNDING			\$ 58,968,070	\$ 24,403,558	\$ 17,157,296	\$ 9,454,372	\$ 7,133,500	\$ 520,285	\$ 299,059
Estimated Bond Issues			\$ 7,679,852				\$ 7,679,852		\$ -

Rural Wastewater System	Five-Year Capital Program				Projected Future Expenses by Year				
	As Adopted 2/2016	Proposed Changes	Recommended	Previous Expensed	FY17	FY18	FY19	FY20	FY21
PROJECT COSTS									
Scottsville WRRF	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Glenmore WRRF	-	61,000	61,000	-	-	-	-	-	61,000
Total Rural Wastewater Systems	\$0	\$61,000	\$ 61,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 61,000
FUNDING SOURCES RURAL SYSTEM - NEEDS									
Future Cash Reserve			\$ 61,000	\$ -	\$ -	-	-	-	61,000
TOTAL RURAL WASTEWATER FUNDING			\$ 61,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 61,000
Estimated Bond Issues			\$ -		\$ -				

2017 Adopted CIP vs. 2016 Adopted CIP

	2017-2021 Adopted CIP	2016-2020 Adopted CIP	Change \$	Change %
Project Cost				
Urban Water Projects	\$ 60,844,736	\$ 53,551,494	\$ 7,293,242	14%
Urban Wastewater Projects	58,968,070	64,156,755	(5,188,685)	-8%
Rural Projects	16,072,890	15,566,890	506,000	3%
Total Project Cost Estimates	\$ 135,885,696	\$ 133,275,139	\$ 2,610,557	2%
Funding in place				
Debt Proceeds available	\$ 41,251,626	\$ 56,104,056	(14,852,430)	-26%
Debt Proceeds Used	34,162,375	16,881,332	17,281,043	102%
Cash-Capital Used	3,679,338	6,280,469	(2,601,131)	-41%
Cash-Capital Available	9,682,421	7,250,000	2,432,421	34%
	\$ 88,775,760	\$ 86,515,857	\$ 2,259,903	3%
Financing Needs				
Possible Future Reserves	\$ 7,830,344	5,173,818	2,656,526	51%
New Debt	39,264,350	41,585,464	(2,321,114)	-6%
	\$ 47,094,694	\$ 46,759,282	\$ 335,412	1%
Total Funding	\$ 135,870,454	\$ 133,275,139	\$ 2,595,315	2%
Percentage of funding in place	65.3%	64.9%		
Ratio of debt to expense	84.4%	86.0%		
Ratio of cash to expense	15.6%	14.0%		

Detail by Major Systems	Total Adopted 3/28/17 CIP	Urban Water Projects	Urban Wastewater Projects	Water Rural Projects	Wastewater Rural Projects
<u>Project Cost</u>					
Urban Water Projects	\$ 60,844,736	\$ 60,844,736	\$ -	\$ -	\$ -
Urban Wastewater Projects	58,968,070	-	58,968,070	-	-
Rural Projects	16,072,890	-	-	16,011,890	61,000
Total Project Cost Estimates	\$ 135,885,696	\$ 60,844,736	\$ 58,968,070	\$ 16,011,890	\$ 61,000
<u>Funding in place</u>					
Debt Proceeds available	\$ 41,251,626	\$ 16,655,700	\$ 20,871,895	\$ 3,724,031	\$ -
Debt Proceeds Used	34,162,375	10,685,200	22,055,096	1,422,079	-
Cash-Capital Used	3,679,338	1,322,438	2,348,462	8,438	-
Cash-Capital Available	9,682,421	5,300,000	3,943,421	439,000	-
	\$ 88,775,760	\$ 33,963,338	\$ 49,218,874	\$ 5,593,548	\$ -
<u>Financing Needs</u>					
Possible Future Reserves	\$ 7,830,344	5,700,000	2,069,344	-	61,000
New Debt	39,264,350	21,166,156	7,679,852	10,418,342	-
	\$ 47,094,694	\$ 26,866,156	\$ 9,749,196	\$ 10,418,342	\$ 61,000
Total Funding	\$ 135,870,454	\$ 60,829,494	\$ 58,968,070	\$ 16,011,890	\$ 61,000
Percentage of funding in place	65.3%	55.8%	83.5%	34.9%	0.0%
Ratio of debt to expense	84.4%	79.7%	85.8%	97.2%	0.0%
Ratio of cash to expense	15.6%	20.3%	14.2%	2.8%	0.0%

Rivanna Water and Sewer Authority
 CIP 2017-2021
 Summary Information - Adopted 3/28/17

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PROPOSED 5-YEAR CIP CHARGE ANALYSIS ESTIMATES

Note - this fixed rate (charge) analysis is intended to show the effect of the draft CIP on the current adopted debt service charges. It is meant to provide a comparison of the next five years. It is not setting fixed rates for the next 5 years.

TOTAL RATE IMPACT	Annual Debt Service <u>FY 2017</u>	Current Charge Debt Service <u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>Total</u>
		Per Month	Per Month	Per Month	Per Month	Per Month	Per Month	Per Month
URBAN WATER								
CITY								
Urban Water - Current Adopted	1,955,614	\$ 162,968						
Annual CIP - Growth Charge			\$ (1,842)	\$ 7,292	\$ 7,292	\$ 7,292	\$ 7,292	\$ 27,325
New Charge estimate			\$ 161,126	\$ 168,418	\$ 175,710	\$ 183,001	\$ 190,293	\$ 190,293
Annual percentage change			-1.1%	4.5%	4.3%	4.1%	4.0%	
Total percentage change								16.8%
ACSA								
Urban Water - Current Adopted	3,408,375	\$ 284,031						
Annual CIP - rate needed			\$ 1,333	\$ 4,667	\$ 4,700	\$ 6,867	\$ 6,867	\$ 24,433
New Rate estimate			\$ 285,365	\$ 290,031	\$ 294,731	\$ 301,598	\$ 308,465	\$ 308,465
Annual percentage change			0.5%	1.6%	1.6%	2.3%	2.3%	
Total percentage change								8.6%
URBAN WASTEWATER								
CITY								
Urban WWater - Current Adopted	4,428,448	\$ 369,037						
Annual CIP - rate needed			\$ 23,699	\$ 14,742	\$ 14,742	\$ 14,742	\$ 14,742	\$ 82,665
New Rate estimate			\$ 392,736	\$ 407,478	\$ 422,219	\$ 436,961	\$ 451,703	\$ 451,703
Annual percentage change			6.4%	3.8%	3.6%	3.5%	3.4%	
Total percentage change								22.4%
ACSA								
Urban WWater - Current Adopted	2,667,355	\$ 222,280						
Annual CIP - rate needed			\$ 2,710	\$ 11,517	\$ 11,517	\$ 11,517	\$ 11,517	\$ 48,776
New Rate estimate			\$ 224,989	\$ 236,506	\$ 248,023	\$ 259,539	\$ 271,056	\$ 271,056
Annual percentage change			1.2%	5.1%	4.9%	4.6%	4.4%	
Total percentage change								21.9%

Rivanna Water and Sewer Authority
 CIP 2017-2021
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Rural Rate Impacts

(all rates are monthly)

		<u>Current Charges</u>	<u>Debt Service Increase</u>					<u>Total</u>	<u>5-Year Avg. Annual Increase</u>
			<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>		
Crozet Water	Operations	\$ 76,152							
	Debt Service	<u>47,997</u>							
		\$ 124,149	\$ 12,500 10.1%	\$ 12,500 10.1%	\$ 12,500 10.1%	\$ 12,500 10.1%	\$ 12,500 10.1%	\$ 62,500 50.3%	\$ 12,500
Scottsville Water	Operations	32,534							
	Debt Service	<u>10,848</u>							
		\$ 43,382	- 0.0%	- 0.0%	- 0.0%	- 0.0%	- 0.0%	- 0.0%	-
Glenmore Wastewater	Operations	26,562							
	Debt Service	<u>132</u>							
		\$ 26,694	- 0.0%	- 0.0%	- 0.0%	- 0.0%	- 0.0%	- 0.0%	-
Scottsville Wastewater	Operations	21,173							
	Debt Service	<u>768</u>							
		\$ 21,941	- 0.0%	- 0.0%	- 0.0%	- 0.0%	- 0.0%	- 0.0%	-
All Rural Rate Centers Monthly		\$ 156,421							
		\$ <u>59,745</u>							
		\$ 216,166	\$ 12,500 5.8%	\$ 12,500 5.8%	\$ 12,500 5.8%	\$ 12,500 5.8%	\$ 12,500 5.8%	\$ 62,500 28.9%	\$ 12,500 5.8%

Summary of Debt Service Charges - Annually							
		FY2018	FY2019	FY2020	FY2021	FY2022	Total
Current FY2017	\$ 716,940						
Annual Additional Revenue Needs		\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 750,000
Total Annual Charge for Debt Service		\$ 866,940	\$ 1,016,940	\$ 1,166,940	\$ 1,316,940	\$ 1,466,940	\$ 1,466,940
		20.9%	17.3%	14.8%	12.9%	11.4%	104.6%